PROVINCE OF ALBERTA

HIGH SCHOOL AND UNIVERSITY
MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1936

ALGEBRA 2.

Time—$2\frac{1}{2}$ hours.

Note—Sufficient work must be shown to indicate method of solution for all questions except number 3, where answers only are required. Graph paper will be supplied by the presiding examiner.

Values

5 **1.** (*a*) Find the value of $\frac{2\sqrt{3}-\sqrt{6}}{2\sqrt{3}+\sqrt{6}}$ to two places of decimals. ($\sqrt{2}=1.4142$)

7 (*b*) Solve:

$$\sqrt{x+16}=\sqrt{x+5}+1$$

5 **2.** (*a*) Multiply $x^{\frac{2}{3}}+3-4x^{-\frac{2}{3}}$ by $x^{\frac{2}{3}}-3-4x^{-\frac{2}{3}}$.

6 (*b*) By attempting to extract the square root of $x^4+4x^3+6x^2+3x+7$, find a value of x which will make the expression a perfect square.

3 (*c*) For what value of x is x^6-8x^3+16 a perfect square?

20 **3.** Copy the following and complete each statement. Proofs are not required.

(*a*) The distance travelled by a wheel is D yards. The circumference of the wheel is C inches. The wheel turns around .... times.

(*b*) The two consecutive integers after n are .... and ....

(*c*) If the perimeter of a rectangle with length L inches is P inches, the width of the rectangle in terms of P and L is ....

(*d*) John has $\frac{3}{x}$ of an apple. James has the remainder of the apple. James' part is .... times as large as John's part.

Values

(*e*) A rectangular sheet of metal C inches long and D inches wide weighs G ounces. A sheet of the same metal x ft. long and y ft. wide weighs .... ounces.

(f) If a book that costs \$$x$ is sold for \$$y$, the per cent profit on the selling price is ....

....

(*g*) Fred and Dick shovelled snow for a day. Fred earned $\frac{x}{y}$ times as much money as did Dick.

What fraction of their total money earned was Fred's? ....

(*h*) $12xy \div \frac{1}{4}xy =$

(*i*) $\frac{-21a^6b^2}{-7a^3b^8} =$

(*j*) Simplify: $\frac{a}{a^5+a}$

4. Attempt any *two* parts:

6 (*a*) Find the roots of the general quadratic equation:

$$ax^2+bx+c = 0$$

6 (*b*) Solve, with verification:

$$9y^4+12 = 31y^2$$

6 (*c*) Find the cube roots of 1.

8 **5.** Evaluate:

(*a*) $\left(\frac{10}{x^2}\right)^3 \left(\frac{x^3}{10x^{-1}}\right)^2$, when $x = 4$.

(*b*) $\frac{x+y}{x^{-1}+y^{-1}}$, when $x = 3$ and $y = 2$.

Simplify:

(*c*) $\frac{a^{1.5} \times \sqrt{a^5}}{a^2}$

(*d*) $\frac{(a^{n-1})^{n-2}}{a^{n^2} \times a^2 \times (a^3)^{-n}}$

8 **6.** Solve algebraically, with verification:

$$\begin{cases} x^2+y^2=61 \\ x+y=11 \end{cases}$$

2 Using the same axes, draw the graphs of both equations and indicate their common solutions.

Values

6 **7.** *Either*

(*a*) Under what conditions, if any, is

$$\frac{1}{x-1}+\frac{1}{x-4}=\frac{1}{x-2}+\frac{1}{x-3}?$$

6 (*b*) Under what conditions, if any, is

$$(x-1)(x-2)(x-6)+(x-1)(x-2)(x-5) = (x-4)(x-2)(x-3)+(x-2)^2(x-3)?$$

Or

2 (*a*) Has the equation $x-y=3$ any solutions? Discuss.

1 (*b*) Has the equation $x+y=5$ any solutions? Discuss.

2 (*c*) What is the relation of the pair of numbers (7,4) to equation (*a*)? To equation (*b*)?

1 (*d*) What is the relation of $(7,-2)$ to (*a*)? To (*b*)?

3 (*e*) Explain the meaning of the word "solve" in the problem:

Solve the system of equations

$$\left\{\begin{matrix} x-y=3 \\ x+y=5 \end{matrix}\right\}$$

3 (*f*) Discuss the problem:

Solve the system of equations

$$\left\{\begin{matrix} ax+by=c \\ ax+by=2c \end{matrix}\right\}$$

where c is not 0.

6 **8.** *Either*

Find the velocity, v ft. per second, after T seconds, of a projectile of weight w pounds and diameter d inches, projected with a muzzle velocity of u ft. per second, using the formula:

$$T=7000\frac{w}{d^2}\left(\frac{1}{v}-\frac{1}{u}\right)$$

6 Find v for a 10 pound projectile with diameter 6 inches at the moment one minute after it leaves the muzzle with a velocity of 800 ft. per second.

Or

12 The distances from A to B by two different routes are 81 miles and 85 miles. A motor car taking the longer road travels on the average two miles per hour faster than the one taking the short route and makes the journey in 15 minutes less. Find the speed of each car.

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